

distinct. The premaxillary appears to extend beneath the whole length of the maxillary. Should this feature be substantiated, it will indicate a resemblance to Cyprinidæ. The maxillary has a high expansion of its superior margin, and then contracts towards its extremity. Above it two bones descend steeply from above, which may be out of position. The preoperculum is not serrate. The superior ribs are well developed.

This form approaches, in its anterior mouth, the true Cyprinidæ through *Bubalichthys*. It is the first extinct form of Catostomidæ found in this country.

AMYZON MENTALE. Cope. Species nova.

This fish occurs in considerable numbers in the Osino shales, and numerous specimens have been procured. Two only of these are before me at present. They are of nearly similar length, viz., M. O. .12 and .105. The most elevated portion of the dorsal outline is immediately in front of the dorsal fin. From this point the body contracts regularly to the caudal fin. The dorsal fin is long, and is elevated in front and concave in outline, the last rays being quite short. They terminate one half the length of the fin in front of the caudal fin. The interneural spines are stout in front and weak behind. Radii, III. 26, and (?) II. 23. There are about twenty-three vertebræ between the first interneural spine and the end of the series in the former specimen, in which, also, there are no distinct remains of scales. In the second, scales are preserved, but no trace of lateral line; there are six or seven longitudinal rows above the vertebral column. The anal fin is preserved somewhat damaged; the rays are not very long, and number II. 7. The anterior interhæmal is expanded into a keel anteriorly. Ventral fins injured.

The ribs and supplementaries are well developed. The inferior quadrate is a broad bone, with deep emargination for the symplectic. Depth No. 2 in front of dorsal fin, M .025. Length basis of dorsal, .026.

ON THE EXISTENCE OF DINOSAURIA IN THE TRANSITION BEDS OF WYOMING.

BY EDWARD D. COPE.

(Read before the American Philosophical Society, Sept. 19, 1872.)

During the present season, F. B. Meek, of Dr. F. V. Hayden's Geological Survey of the Territories, discovered some large bones near Black Buttes Station, on the Union Pacific Railroad, fifty-two miles east of Green River, and near the Hallville Coal Mines. Shortly afterwards I visited the spot with a branch expedition, and commenced excavations with a view to the recovery of the remainder of the animal. The position was discovered to be between the thinner or lower strata of the Bitter Creek series of coal, which at this point, occupy a position of elevation and crop out high on the bluffs. Two strata appear above the

sandstone in which the bones occur, and one below it. The portions of the skeleton found, rested in the midst of vegetable debris, as sticks and stems, and was covered with many beautiful dicotyledonous leaves, which filled the interstices between the bones. The plant-bed gradually passed into a shell-bed, containing numerous thin dimyaria, and close by, some oysters were found. The whole question as to geologic age and aqueous conditions during which these beds were deposited, being unsettled, I gave especial attention to the recovery of the bones, with the view of reaching a definite conclusion on these points.

We succeeded in recovering sixteen vertebræ, including a perfect sacrum, with dorsals and caudals; both iliac and other pelvic bones, those of one side nearly perfect; some bones of the limbs, ribs and other parts not determined.

The vertebræ are large. The dorsals are short, with vertically oval centra, and small neural canal. The diapophyses originate well above the neural canal, diverge upwards, and are triangular in section. The neural spine is very much elevated, and the arch short antero-posteriorly. The zygapophyses are close together in both directions, those of the same aspect being separated by a narrow keel only. They do not project, but consist of articular surfaces cut into the solid spine. The latter is flat and dilated distally. The articular faces are nearly plane with a slight median prominence.

The ribs have two articular surfaces, but I found no capitular pit on the dorsal centra.

Elevation of centrum, 7.5 in. ; width of the same, 5 in. 7.5 lines ; length of do. 3 in. 8.5 lines. Total elevation of a dorsal vertebra, twenty-eight inches three lines. The sacrum consists of five vertebræ, the anterior centrum not depressed. They give out huge diapophyses which are united by suture. They are themselves united distally in pairs, each pair supporting a longitudinal convex articular face for the ilium. Each pair encloses a perforation with the centra. The first diapophysis goes off from the point of junction of the first and second vertebræ, the second from the third only, and is more slender. The total length is 25 in. ; and the width 30 in. Its vertebræ are flat below, with latero-inferior angles. The last centrum gives off a simple diapophysis.

Another vertebra exhibits a diapophysis as low as the floor of the neural canal and united by coarse suture. Others posterior to the sacrum are more elongate with slightly compressed centrum, and with diapophysis opposite floor of canal and not united by suture. Centra flat below; no chevron bones discoverable. Length centrum, 4 in. 4 lines; depth of articular face, 4 in. ; width of do. 4 in. 3 lines.

The iliac bone is extended antero-posteriorly. One extremity is thick and rather obtuse, but of little depth. There is a large protuberance above the acetabular sinus. The other extremity is dilated into a flat thin plate of rather greater length than the stouter extremity. From

one of its margins, a rod-like element projects. Its total length is about four feet, of which the acetabular sinus measures about 8.10 inches.

A short bone pertaining to the limbs has the articular surfaces at a strong angle to each other, hence the shaft is twisted. It is deeply grooved on one side near the extremity. The other extremity bears a rather flattened hour-glass shaped articular face, and below it on one angle is a crest. The convexity of the surface is not great, and this extremity resembles that of a Dinosaurian or Crocodilian reptile. Its length is, however, only eight and a quarter inches; apparently too small for a humerus, though this is not certain, while it is decidedly too small for a metatarsal of such an animal.

From the above description, it is evident that the animal of Black Buttes is a Dinosaurian reptile, the characters of the sacral and iliac bones alone sufficing to demonstrate this point. If the reader will compare the measurements given for species of this group already known, he will observe that those of the present animal exceed those yet described from North America. It is possible that if the corresponding parts of *Hadrosaurus tripos*, Cope, or *Thespesius occidentalis*, Leidy, are discovered, they may approach it.

It is thus conclusively proven that the coal strata of the Bitter Creek Basin of Wyoming Territory, which embraces the greater area yet discovered, were deposited during the Cretaceous period, and not during the Tertiary, though not long preceding the latter. It appears that the forests that intervened between the swamps of epochs, during which the coal was formed, were inhabited by these huge monsters. That one of them laid down to die near the shore of probably a brackish-water inlet, and was soon covered by the thickly fallen leaves of the wood. That continued subsidence of the level submerged the bones, which were then covered by sand.

The form of the ilium differs very materially from that of *Hadrosaurus*, and the vertebræ are plane, thus differing from *Thespesius*. The limb bone is distinct from anything in *Laelaps*, which, moreover, probably resembles *Thegalosaurus* in its ilium. The present form recalls rather *Cetiosaurus*. As it is evidently new to our system, it may be called  
AGATHAUMAS SYLVESTRIS.

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#### NOTICES OF NEW VERTEBRATA FROM THE UPPER WATERS OF BITTER CREEK, WYOMING TERRITORY.

BY EDWARD D. COPE.

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SYNOPLOTHERIUM CANIUS. Cope. Gen. et sp. nov.

This genus possesses the dental formula so far as known,  $I. \frac{3}{1} c. \frac{1}{0} M. \frac{2}{0}$ . In the only specimen with molars, the crowns are much worn, but in all, the antero-posterior much exceeds the transverse diameter, and consisted